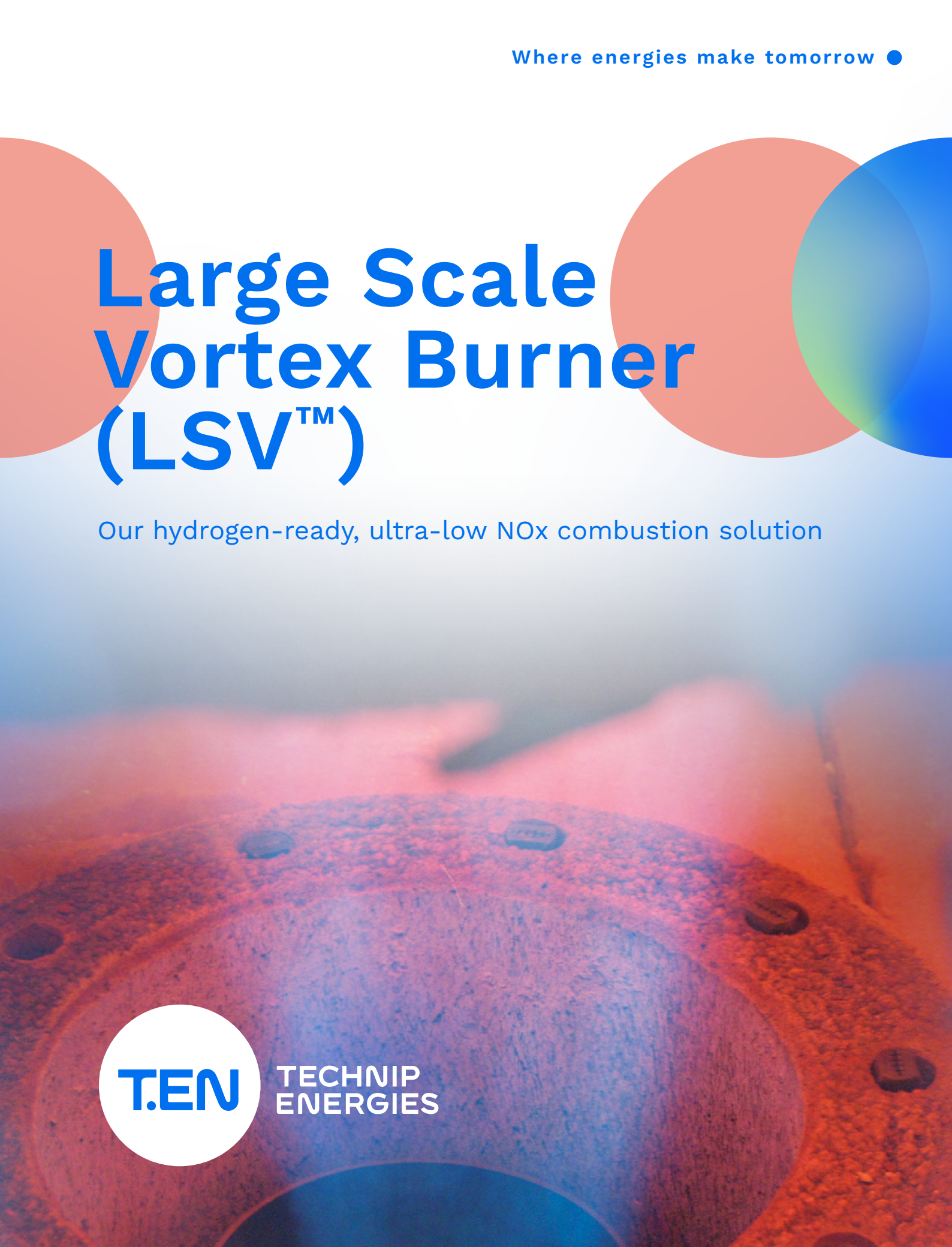
Where energies make tomorrow

Large Scale Vortex Burner (LSV™)

Our hydrogen-ready, ultra-low NOx combustion solution



T.EN TECHNIP ENERGIES

Technip Energies' burner technology

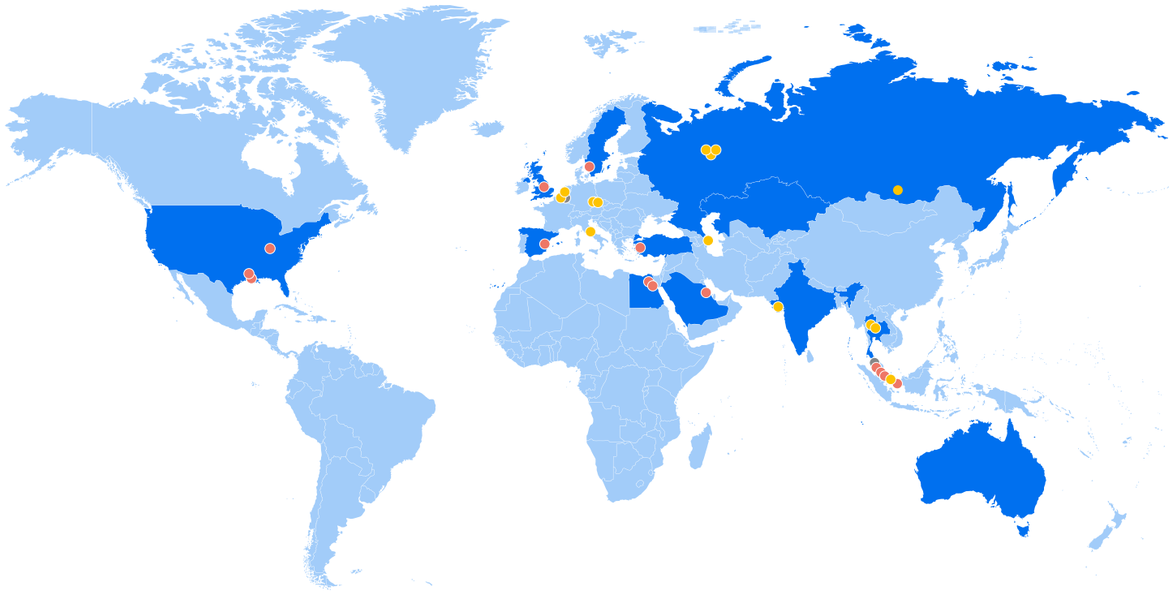
Leading design and construction of tomorrow's plants

Clients and regulators are placing more stringent demands on combustion systems than at any time in the past. On the one hand, plant owners target a lower carbon footprint, higher capacity, greater reliability and lower costs. On the other, regulators mandate higher efficiency and tighter emission tolerances on pollutants like carbon monoxide (CO) and nitrogen oxides (NOx).

In response to changing market conditions and the evolving legislative framework, Technip Energies' offers proven combustion solutions, including our LSV™ burner technology.

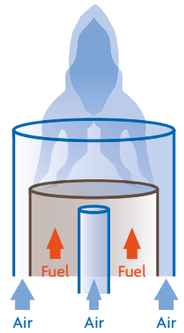
Originally developed by Air Products, LSV burners have demonstrated over two decades of reliable performance in steam methane reformers and ethylene cracking furaces. The LSV burner offers fuel flexibility and can be operated over a wide range of conventional fuels and up to 100% hydrogen fuel.

LSV installed in :
15 Hydrogen Reformers
32 Ethylene Cracking Furnaces



Why choose the LSV burner?

The LSV burner is a cost-effective, ultra-low NOx burner solution representing Technip Energies' know-how and successful track record in combustion system design. It can be applied to a wide range of fired heater applications and will accommodate all combustion air supply modes (natural draft, induced draft, forced draft, balanced draft and/or gas turbine exhaust). Combustion air may be at ambient temperature or preheated to above 500°C. The burner is suitable for a wide range of fuel gas compositions, including hydrogen, ammonia, gas turbine exhaust, oxyfiring and flue gas recirculation, and is further suitable in many firing configurations, e.g. roof (top down-shot firing) and floor (bottom upshot firing) in the firebox. The burners can be and have successfully been applied to a wide range of fired heater applications, including for retrofit projects, and will result in higher capacity and runlength.



Robust Design for Unique Benefits

FEATURES	BENEFITS
Unique nozzle design to rapidly dilute fuel	• Flameless combustion • Low NOx
Flexible fluidic flame stabilizer	• Ultra-lean, cool primary flame and low NOx
Multi-fuel flexibility	• Burner can be used for a wide range of processes • 100% Hydrogen firing proven / carbon emission free firing • Ammonia firing proven / support use of ammonia as low carbon energy carrier
Shielded fuel lances	• High-grade, standard tip materials • No coking or plugging • Clean tips • Suitable for hydrogen fuel firing
Adjustable and uniform flame heat release profile	• Heat release matching process requirements • Lower radiant tube wall temperature • High firebox efficiency
Robust design	• Reliable • Operation proven 20+ years • Trouble-free plant operations • Simple, single burner block design • Manufactured by Technip Energies • State-of-the-art manufacturing practices
The burner flame is not in contact with any metal or refractory parts	• Low NOx emission • 100% hydrogen-fuel ready

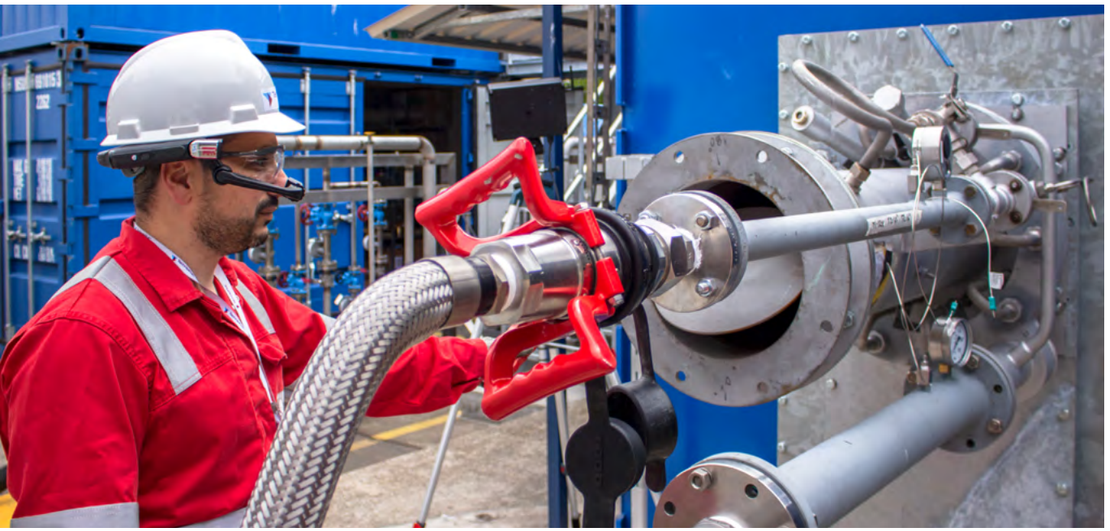
Research and development

Technip Energies continuously improves and develops the LSV technology in a radiant firebox environment.

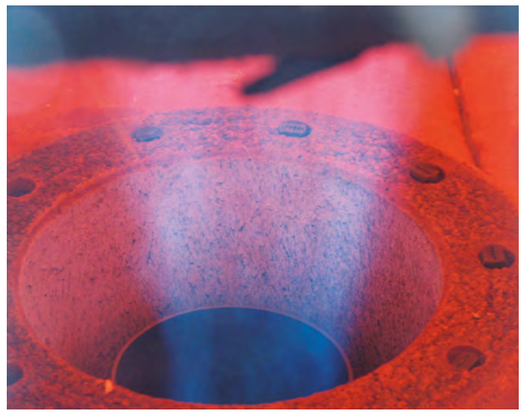
Our combustion experts continue to develop the burner technology at T.EN's own burner test facility in The Netherlands to improve performance, flexibility and achieve even lower emissions. Please see our Technip Energies flysheet "Technip Energies Burner Test Facility."

Technip Energies applies its LSV for 100% firing of hydrogen. Substituting methane (or other carbon-containing fuels) with 100% hydrogen avoids direct CO_2 emissions from the furnace. Replacing hydrocarbon-based fuel with clean-burning hydrogen is an important way to advance the energy transition across many industries.

We offer burner demonstrations at our test facility. The burner demontration is used to validate the LSV burner design as part of our project execution.



TEST FURNACE



Bottom-mounted LSV burner in operation

Top-mounted LSV burner in operation

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